Beamline 19-BM / SBC-CAT

Scientific focus: Macromolecular crystallography

Scientific program: Structural biology

Optics & Optical Performance

- 6–20 keV standard spectral range
- 0.11 mm hor. x 0.06 mm vert. FWHM focused spot size
- Rosenbaum-Rock double-crystal monochromator
  - water cooled
  - sagitally focusing 2nd crystal
  - 6:1 demagnification
  - 6°–40° Bragg angle range
  - 1st crystals: Si(111), Si (220), Si(331)
    - 25 mm wide ea., common cooler carrier
  - 2nd crystals: Si(111), Si(220), Si(331)
    - exchangeable, 25 mm x 125 mm
  - 35 mm beam offset (nominal)

- Rosenbaum-Rock vertical focusing mirror
  - 9:1 demagnification
  - Zerodur plane mirror substrate
  - 1020 mm x 100 mm x 38 mm
  - 2 A rms roughness
  - 1 µrad surface figure error
  - Pt, none, Pd coating stripes (35 mm wide ea.)
  - two motorized, encoded supports
  - dynamic, independent bending mechanism
    - at both ends
  - aberration correction via elliptical bending

Experiment Stations

19-BM-A

- white beam first optics enclosure

19-BM-C

- white beam optics enclosure

19-BM-D

- monochromatic experiment station
- kappa goniostat for macromolecular crystallography
- guard slits
- filter/shutter
- detector support and positioner

Detectors

- SBC1 3k x 3k CCD
  - built by ANL-ECT
  - 210 mm x 210 mm active area
  - 1.8 sec readout

Beamline Controls and Data Acquisition

- Multiprocessor SG1 workstation, plus two UNIX work stations for data acquisition and data processing
- 3 HP workstations running EPICS, VME for beamline and detector control
- PMAC motor controller, software by ANL-ECT
- GUI for beamline control, data acquisition, and detector control by ANL-ECT

Beamline Support Equipment/Facilities

- Rosenbaum-Rock miniaturized kappa goniostat
- high-magnification alignment cameras (two)
- Rosenbaum-Rock high-precision detector support and positioner
- liquid-nitrogen cryosystem sample cooler

Bending Magnet Source Characteristics (nominal)

source	APS bending magnet
critical energy	19.51 keV
on-axis peak brilliance at 16.3 keV	2.9×10^{15} ph/sec/mrad²/mm²/0.1%bw
on-axis peak angular flux at 16.3 keV	9.6×10^{13} ph/sec/mrad²/0.1%bw
on-axis peak horizontal angular flux at 5.6 keV	1.6×10^{13} ph/sec/mradh/0.1%bw
source size at critical energy Σ_x Σ_y	 145 μm 36 μm
source divergence at critical energy $\Sigma_{x'}$ $\Sigma_{y'}$	 6 mrad 47 μrad